

Spica, but its femoral portion will extend a little lower upon the thigh than in the ordinary *spica*. I shall renew this dressing every third or fourth day.

At the same time I shall give the patient three or four tablespoonfuls of cod-liver oil daily, and prescribe five ounces of vin de quinquina to be taken before breakfast, and the same quantity before the evening meal, and I shall nourish him as well as possible.

I should like also to protect him from the exhaustion of masturbation; for patients of delicate constitution, in whom we have reason to fear suppuration of the bones, find in excesses of this kind an increase of their debility and its consequences. In private practice I advise the parents not to leave the young man alone, to distract his attention and occupy him as much as possible; in the hospital this care is impossible, but I shall give all the advice necessary.

We shall continue this treatment for a month, and then stop the use of the bandage and allow the patient to get up for a short time each day. If I find that he does not suffer I shall make him walk a little more every day, and if he still does not suffer I shall consider him cured.

If, on the other hand, the attempt shows that a cure has not been obtained, I shall advise him again to remain in bed and shall make use of some revulsive on the skin. For this I shall have to choose between blisters, caustics, and punctate cauterization. I have no absolute preference for any one of these, for thus far my experience has not demonstrated the superiority of one over the other—nevertheless, punctate cauterization is the one which I shall use if after a month's rest in bed this young man still suffers a little on pressure and when walking.

(Punctate cauterization was applied, forty points, with a small iron rod, at white heat, while the patient was anaesthetized with chloroform. Six weeks afterwards all pain had disappeared and the patient was considered cured. He left the hospital, and has not since been seen.)

LECTURE VI.

I. HYPEROSTOSIS OF RIGHT FEMUR. II. NECROSIS OF LEFT TIBIA.

Some considerations upon diseases of the skeleton in the infant and in the adolescent—I. Hyperostosis of the femur and ankylosis of the knee following a non-suppurating epiphysary osteitis—Fresh inflammatory attack, also not terminating in suppuration—II. Necrosis of the tibia following a suppurating epiphysary osteitis—Fresh inflammation—Movable superficial sequestrum, immovable invaginated sequestrum—Long duration of this necrosis probably until adult life.

GENTLEMEN: Chance has recently brought together in our wards two patients suffering from the late consequences of the disease which you often hear me speak of as *acute epiphysary osteitis of youth*.

But first of all, I must make an explanation.

In pointing out to you the diseases of youth I do not mean, and I have never meant to say, that these diseases belong exclusively to youth, and are not seen at other ages; I wished to say that they were more frequent during youth, and that, as a rule, they took on at this age characters different from those which are seen in the same lesion at other periods of life.

I have been criticized upon this subject. Especially with reference to acute epiphysary osteitis, it has been objected that this disease is seen in childhood.

I knew that perfectly well, but I also knew two other things: first, that it is less frequent than in adolescents; second, that it is also less dangerous.

I knew also, in the third place, that osteitis of adults does not take on spontaneously, and without the intervention of solutions of continuity affecting at the same time the bones and the soft parts, those dangerous forms which occur almost spontaneously in the child and in the youth. However, to enable you to decide the question for yourselves I give you the statistics published upon the subject.

Dr. Cullot, author of a very good thesis,¹ gives the following table of the ages at which epiphysary osteitis appears:—

From 1 to 18 months . . .	2 cases.
" 2 to 6 years. . . .	7 "
" 6 to 10 "	10 "
" 10 to 14 "	21 "
" 14 to 18 "	33 "
" 18 to 22 "	8 " 6 of which were between 18 and 19.
" 22 to 29 "	1 case.
" 29 to 30 "	1 "

M. Sézary,² who collected, also, for his graduating thesis, 92 cases, of which 57 were between the ages of 12 and 19, finds an average of 13 years. But the average of 33 cases observed by himself at the Hôtel-Dieu of Lyons was 16 years.

Klose's 13 cases average 13 years.

M. Chassaignac³ mentions 23 cases, of which 4 were between 9 days and 10 years; 15 from 10 to 18 years; and 4 from 18 to 36 years old.

From all these figures, which have been reproduced in an excellent thesis by Dr. Salès,⁴ it results, gentlemen, that the end of childhood and the first years of adolescence, until about the age of 19, are the periods of life during which appear, chiefly, but not exclusively, the diseases which we are about to consider. They are most often met with between the ages of 12 and 18.

And here let me say that in speaking of adolescence, we do not give it perfectly defined limits, sometimes it is considered as beginning at 12, sometimes at 13, sometimes at 14 years, and when we clinicians speak of the diseases of adolescence or youth, and especially of those

¹ Cullot, De l'Inflammation Aiguë primitive de la Moëlle des Os. Paris, 1871.

² Sézary, De l'Adolescence. Thèse de Paris, 1871, and Gazette des Hôpitaux, 1871, page 9, et seq.

³ Chassaignac, Traité de la Suppuration et du Drainage, vol. i. page 413.

⁴ Salès, De la Marche et du Traitement de l'Ostéo-périostite dia-épiphysaire suppurée. Thèse de Paris, 1871.

which we attribute to a derangement of nutrition while the bones are lengthening, and at the moments of that exaggeration of vitality which prepares the union of the epiphyses, we know that this exaggeration presents numerous individual varieties. In some patients it occurs at 12 or 13, in others at 16, 17, and 18 years of age, in some the growth is progressive and slow without any excess of activity more marked at certain moments; in others, on the contrary, this excess of activity appears several times and irregularly. In short, a child 11, 12, or 13 years old may be adolescent as to his epiphyses, but not as to the rest of his body.

At the time when I published my first work upon this subject,¹ pathologists and clinicians were accustomed to describe diseases of the skeleton according to the data of pathological anatomy and physiology without considering age, and without warning practitioners that such a form of acute osteitis appeared especially at such or such a period of life. My object was to call attention to this subject, and to show the relations between the age and growth of the skeleton on the one side, and the forms of spontaneous osteitis on the other, and I have seen with pleasure that subsequent works upon this subject have followed the path which I opened. I made certain reservations relative to childhood, because, not having practised in the children's hospitals, I could not know what took place in the first and second periods of childhood; I insisted particularly upon the frequency with which I had observed the diseases to occur in adolescents as compared with adults.

Since then my colleague, M. Giraldès,² has well shown that children may be affected, especially at the end of childhood, or, if you prefer, at that period of life which is between the end of childhood and the beginning of adolescence. The excellent works of Messrs. Gamet³ and Louvet,⁴ and those already quoted of Messrs. Sézary, Callot, and Salès confirmed these assertions of M. Giraldès and myself, and enabled us to draw practical conclusions from this simple fact: the latter part of childhood and adolescence are exposed to forms of spontaneous acute osteitis which are seen much more rarely at other ages.

Let us now turn to the two patients with reference to whom I thought it necessary to present these preliminary considerations.

I. The first is a young man 19 years old, pale, with chestnut hair, but with well-developed muscles, showing no scars upon the neck, and giving no indication, past or present, of tubercular affection. He tells us that at the age of 13½ years, without appreciable cause, or after a blow which he does not remember very distinctly, he had severe pain in the right knee and the lower part of the thigh; that he was very ill at this time and had much fever; that after a few weeks an abscess was opened on the inner and lower part of his right thigh, which suppurated for a long time, and finally closed without the expulsion

¹ Gosselin, Archives générales de Médecine, 1858, tome ii. p. 518.

² Giraldès, Leçons cliniques sur les Maladies chirurgicales de l'Enfance, p. 588.

³ Gamet, Thèses de Paris, 1862.

⁴ Louvet, Périostite phlegmoneuse diffuse, Thèses de Paris, 1876.

of any sequestrum or fragments; that at last a cure took place, leaving the knee slightly flexed and immovable, and compelling the patient to use a cane and a shoe with a heel three inches high.

A week ago, without apparent cause, he again began to suffer a little in the lower part of his thigh and knee, and being no longer able to walk and work at his trade of shoemaking, he applied to us for treatment.

We find the knee completely ankylosed by fusion, the femur and tibia united at an angle of about 40 degrees—what we call angular ankylosis of the knee. There is no notable swelling at this point, and only a little heat.

Above the knee the muscles of the thigh are evidently smaller than those of the opposite side, but yet the lower third of the limb appears a little larger, and on grasping it with the whole hand I feel a very hard circular resistance which gives the idea of a femur much more voluminous than the other or a normal one. I know that one may be deceived by a lesion of the muscles, which I have found in two autopsies, and which has been well described by M. Aug. Ollivier;¹ I refer to atrophy of the muscles, with transformation into a very dense fibrous tissue, which cannot be clearly distinguished from the femur by the hand examining through the skin. But here, as the apparently bony swelling is very large, and as it involves the condyles of the femur themselves in points where there are no muscular fibres of the quadriceps, I infer that the tumefaction occupies, if not the whole, at least part of the lower third of the femur.

Notice also that this swollen portion is painful spontaneously, and upon pressure. As there is no phlegmon which could cause these pains, we may attribute them to the femur; now at this age the bones become more frequently and more easily painful when they are hypertrophied than they do in subjects in whom this condition does not exist.

Furthermore, there is no fever, no notable alteration of health, and the pains, more severe when the patient is standing or walking, have not so far been sufficient to prevent his sleep.

The diagnosis, gentlemen, presents two questions: What is this young man's present disease? and What was the former one which has evidently prepared this one?

As to the present disease, it is composed of combined lesions that are already old, ankylosis of the knee, and hyperostosis of the femur, with concomitant muscular atrophy. These three lesions are irremediable, and they are not what has brought the patient to the hospital. But there is further a recently added pathological condition, a subacute and painful osteitis in the region, and perhaps also in the thickness, of the hyperostosis. If we did not possess the antecedents relative to the acute disease six years ago, we should have to see whether this considerable swelling of the femur were not due to an osteo sarcoma. But with these antecedents, and in presence of the fact that for several years the swelling, instead of increasing, has

¹ Aug. Ollivier, Thèse de Concours pour l'Agrégation, Paris, 1869.

diminished, there is no reason to dwell very long on this diagnosis, and remembering, furthermore, that hyperostosis is often the consequence of osteitis of the long bones, we need not hesitate long; it is subacute osteitis or fresh inflammation in an old hyperostosis.

As to the etiological diagnosis I have nothing in particular to point out.

I shall tell you hereafter that in adults non-suppurating osteo-periostitis is often due to general causes: rheumatism, syphilis, or a feeble state of the constitution similar to the scrofula of children, a sort of acquired or late scrofula. Here none of these general causes can be accused. The fresh inflammatory attack appears to have been spontaneous, or if there has been a traumatic cause it has been a slight contusion of which the patient has preserved no recollection. Perhaps the age of the patient and the exaggerated nutrition of the bones have had some influence. It is true that the union of the inferior epiphysis of the femur was completed long ago, for one of the consequences of these osteites of adolescence is to hasten the union of the epiphysis. Nevertheless, I think the age has had something to do with the etiology; for you will often see in adults hyperostosis consecutive to simple or compound fractures, and you will notice that the inflammatory attacks, necrosis once ended, seldom occur so late.

Let us now consider the other question: What was the original affection, the traces of which we see here, and of which the present symptoms are a remote consequence?

From the information we have gathered and from the analogy between what the patient has told us and what we have observed in a certain number of adolescents, there can be no doubt. This young man was affected at the end of childhood with that disease of which I spoke at the beginning, acute osteitis, ending promptly in suppuration; and as this osteitis appears to have been spontaneous, or, if traumatic, to have been caused by a slight injury, I feel sure it was one of those osteites which begin in the epiphysary cartilage itself, or in one of the adjoining surfaces of bone, and of which the predisposing cause is the work of ossification. I cannot say whether the periosteum alone has supplicated, or whether the compact tissue also, and especially the medullary substance, both that of the canal and that of the cancellous tissue, have participated.

I am convinced that in many cases of this kind all the constituent parts of the bone share in the inflammation, and that there is osteo-myelitis at the same time with periostitis. But when the patient survives, it is very difficult, if not impossible, to show whether the deep portions of the bone have supplicated, as well as the superficial ones, or whether the osteo-myelitis has been non-suppurative, the periosteum, on the contrary, having been attacked and even destroyed by the suppuration. I shall hereafter have occasion to return to this subject; to-day, I say that there has been suppurative osteitis, at least on the surface, and general osteitis, probably non-suppurative, but presenting the form described by Gerdy as *hypertrophying* or *condensing*. This osteitis does not seem to have been necrotic, as it often is in like

cases, and in this respect it is exceptional. But it has got well, leaving behind it the hyperostosis, which is the almost inevitable consequence of hypertrophying osteitis when it occupies the compact tissue of the long bones; and as the peculiarity of this hyperostosis is to preserve, for a certain length of time after its formation, a tendency to subacute or chronic inflammation, and as this is more marked during adolescence, we find in it the origin of the recent inflammation which to-day torments this young man.

Now, what should be our opinion as to the consequences of this disease? What we have to fear is suppuration. It is true that this may possibly occupy exclusively the cellular tissue, without participation of the bone in the process, and form what Gerdy called a *neighbouring abscess* (*abcès de voisinage*). Such an abscess would end like a simple one, without ultimate necrosis. But if the hyperostosis itself should suppurate, either on the surface, after destruction of the periosteum, or in the interior, that would indicate that a portion of the hypertrophied femur was necrosed, and then our patient would be condemned to long suppuration and to the fistulæ which precede the elimination (always very slow) of the sequestra or mortified parts of the bone. Considering all things, I do not much fear this termination, and for the following reasons: the constitution of the patient is not broken down, and as the osteitis escaped necrosis when it was acute, as the present age exposes a little less to it than the one at which the disease of the femur began, and finally, as the inflammatory symptoms are moderate and subacute, we have the right to hope that the present attack also will end by resolution, and that the patient will continue to escape necrosis, to which he will be so much the less exposed as he grows older.

To favour this fortunate termination we have only a very simple treatment to institute.

We shall keep the patient absolutely quiet, and advise him not to walk so long as there is any pain. We shall cover the affected part with poultices, and prescribe 8 or 10 grains of the iodide of potassium daily. If the disease lasts more than three weeks longer, I shall probably prescribe a blister, perhaps punctate cauterization. But I doubt if these measures are useful; for of two things one: either suppuration is inevitable, and then it is too late to have recourse to them, or resolution is to take place, and then rest and simple means suffice.

II. The other young man is 17 years old, and comes to us for the second time. The first time, two years ago, he was suffering with acute epiphysary osteitis of the right tibia, in its lower portion. We found him very ill, with much fever; and the affection ended with large abscesses, some of which communicated with the lower portion of the denuded bone, and the others seemed to communicate with the tibio-tarsal articulation. In a word, it was one of those serious cases, such as I have described,¹ in which the suppurative

¹ Gosselin, Mémoire sur l'Ostéite épiphysaire des Adolescents. (Archives de Méd. 1858.)

inflammation is propagated from the epiphysis and the bone of the neighbouring articulation. Fearing for the life of the youth, and seeing him exposed, if perchance he should not die, to a necrosis which would torment him for many years, I proposed amputation, but his parents refused absolutely. The suppurating osteo-myelitis and arthritis did not assume a form sufficiently putrid to cause purulent infection; the patient also escaped hectic; and when he left the hospital, after six months' stay, he had the tibio-tarsal articulation ankylosed, without persistent necrosis of the astragalus, and preserved at the lower part of the leg, two fistulæ which suppurred freely, and through which the probe reached the tibia, which was denuded over quite a large surface and notably hyperostosed. He walked, furthermore, with the aid of crutches.

The subsequent course of the disease was such as it is in most of the young patients who survive acute epiphysary osteitis ending in suppuration, such, for example, as it was in the case of the young man whom you saw for a long time in our wards last year with necrosis of the femur consecutive to an osteitis of this kind. Suppuration has continued, and he has not been able to lay aside his crutches. New pains accompanied by fever appeared twice, and each time a new abscess formed and a fragment of bone was expelled.

A week ago a new inflammatory attack occurred, which confined the patient to his bed and forced him to seek admission to the hospital. You saw that the lower part of the leg was swollen, hot, red, and painful. The tibia is considerably hypertrophied, and the four fistulæ which lead to it furnish a large quantity of non fetid pus. The probe passed through these fistulæ reaches a denuded surface, and I showed you that, placing a probe in contact with the bone through one of the inner fistulæ, and passing another through the lower one, and pressing with it upon the corresponding portion of denuded bone, I transmitted the movement to the first probe. Thence I concluded that a portion of the bone was necrosed and separated from the rest, that is, that there was a superficial movable sequestrum. Exploring with the probe upon the other side, I felt upon the denuded surface an opening through which the instrument penetrated about half an inch and enabled me to feel another denuded portion, which was not movable, but which appeared to me destined to become so, and to form what is called in the description of necrosis an *invaginated sequestrum*.

The present affection, then, of this young man is a persistent necrosis of the hyperostosed tibia, with superficial movable sequestrum and invaginated sequestrum not yet movable. You know that by the name necrosis we designate a mortification of the bony tissue, that this mortification, affecting more often the compact than the cancellous tissue, is one of the modes of termination of suppurative osteitis, and coincides quite commonly with hypertrophy and condensation, so that these three things—suppuration, hypertrophy, and mortification—almost always go together. Undoubtedly Gerdy's condensing or hypertrophying osteitis can occur in the compact tissue of the long bones without suppuration and

without necrosis. I showed you an example lately in an adolescent, and I shall often show you others in adults. But when this osteitis ends in suppuration, it is at the same time hypertrophying and necrotic; it is what you see distinctly in this case, and what you will also see from time to time in adults; but while in the latter, suppuration, hypertrophy, and necrosis occur, especially after extensive traumatic lesions in which there has been open wound and fracture, or, if you prefer, exposure of the bone to contact with the air, they have occurred in this young man, as is generally the case in adolescents, without external wound, without preliminary exposure, and after an osteitis either purely spontaneous or consecutive to a slight contusion without rupture of the skin.

What will be the ultimate course and what the consequences of this young man's disease? As for the present inflammation, it will cease in a few days, perhaps after formation of another abscess, and the patient's life is not endangered—first, because the fever is moderate, and, according to our experience, is not likely to augment and take on a dangerous character; and secondly, because it is the rule that exacerbated chronic osteitis in an old hyperostosis does not take on the dangerous forms of primitive acute suppurative osteitis.

To what is due this difference in danger between suppurative osteitis preceding hyperostosis, and osteitis consecutive to the latter, when the predisposing cause of age still exists? This is perhaps difficult to explain. I attribute it to differences in structure. Before hypertrophy all the cavities of the bone are filled with fat, the suppuration of which, as I have told you, contributes greatly to give to osteo-myelitis its well-known danger; moreover, there is the epiphysary line in and near which osteitis takes on in the adolescent the intensity and gravity with which you are acquainted. After hyperostosis has occurred the medullary cavity is filled up or greatly diminished, at least in the great majority of cases, and consequently there remains but a small proportion of fat. The cavities of the cancellous tissue and the canaliculi are also diminished and lose most of their fat; hence, as the principal element, suppuration of which causes the danger of osteo-myelitis, is reduced to small proportions, the reappearance of the latter is less dangerous. Furthermore, the epiphysary line has disappeared by ossification, another reason for the mildness of consecutive phlegmasiæ. Notice this, gentlemen: the anatomical result of osteitis is hypertrophy, and with it a certain tendency to relapse; but at the same time it diminishes the number and extent of the bony cavities in which are distributed, amidst the fat, the bloodvessels destined to nourish the bone—hence a certain tendency to mortification in spots, that is, to the necrosis which so often ensues. Consequently, if the favourable result of the anatomical changes caused by the primitive osteitis is to preserve against dangerous relapses, there is yet this other unfortunate result of keeping up prolonged suppuration and necrosis. I say, then, that this young man, in all probability, will not die, and will not even be dangerously ill.

In addition, as his tibio-tarsal articulation is obliterated, we have not to fear a propagation of the suppurative phlegmasia to the synovial membrane; but the necrosis will last for a long time yet, probably for years. Undoubtedly another sequestrum will soon be expelled, but there is still another in course of elimination. There will probably be fresh inflammatory attacks and other portions necrosed which will keep up the suppuration, and that may indeed last until the patient shall have outgrown the age during which the predisposition exists. I know that in this respect there are some varieties, that in certain subjects the new attacks of osteitis cease to occur long before the end of adolescence, notwithstanding the continuance of the hyperostosis, and that sometimes these relapses and the continuation of the necrosis are seen in adults. But since we have to form a prognosis we should do it in accordance with the facts furnished most frequently in our practice. Now I noticed long ago that necrosis and persistent suppuration of the large long bones, especially those of the lower limbs, which have been previously hyperostosed by an acute spontaneous osteitis, are seen especially during adolescence, and end with it. The patient having become adult preserves only the articular deformities, the hyperostosis, and the diminution of the muscles caused by the original disease.

Treatment.—We shall make an incision to remove the superficial movable sequestrum which we felt, and at the same time make the explorations necessary to discover if by chance there is another; then we shall keep the patient in bed, apply poultices, and give him tonics. In a few weeks he will leave us, still preserving the fistulæ and the suppuration, and we shall have no other advice to give him than to avoid such fatigue and contusions as might cause another inflammatory attack.

Some one asked me this morning why I did not propose to this young man to relieve him of his present infirmity and his chances of relapse, by amputation of the leg. These are my reasons: first, amputation would endanger his life, which, in my opinion, is not threatened by the present lesions; and second, I have reason to hope, as I have just told you, that the infirmity is temporary and will disappear with adolescence, and that when from 25 to 30 years old he will walk more easily and will have no more pain and suppuration. In short, he will be cured, with a tibia a little large and an ankylosed articulation which will trouble him much less than an artificial limb, and will certainly be more agreeable to him than a mutilation.

LECTURE VII.

ACUTE EPIPHYSARY OSTEITIS OF THE LEFT FEMUR, WITH SUPPURATING ARTHRITIS OF THE KNEE. AMPUTATION OF THE THIGH.

Description of the piece—Difficulty of determining whether the periosteum is stripped off or destroyed—Suppuration and partial disappearance of the epiphysary cartilage—Diffuse suppuration of the cancellous tissue and the medullary canal—Pus in the articulation—Different names given to the disease—Preference for that of acute epiphysary osteitis—Three varieties of this disease: 1st variety, external periostitis without destruction of the periosteum; 2d variety, superficial osteo-periostitis with destruction of the periosteum; 3d variety, general deep osteitis—Difficulties and interest of the diagnosis of these three varieties.

GENTLEMEN: I show you here the specimens coming from an amputation of the thigh, which I performed the day before yesterday, upon a youth 16 years old who entered the hospital for a suppurating osteo-arthritis of the thigh and knee. The patient was taken suddenly, three weeks ago, after a long walk, with high fever which was at first thought by his physicians to be typhoid fever. But soon a painful swelling appeared at the lower end of the right thigh and the corresponding knee; then deep fluctuation was felt, and it was in this condition that the boy was brought to us after he had been ill twelve days.

We at once felt deep fluctuation on the outer and inner sides of the lower part of the thigh, and also very distinctly in the joint itself, which was notably distended.

The day after his admission I made two free incisions, one on the inner, the other on the outer side, and passing through the vastus internus and vastus externus I reached a large purulent collection and evacuated a pint of creamy, thick pus, slightly fetid and mixed with drops of oil. Passing my finger to the bottom of the abscess I felt the femur denuded on both sides. The articulation was not emptied at first, for by pressing upon it I made no pus escape through the incisions. I was not then sure that the arthritis, which was evident, had gone on to suppuration. The patient was a little relieved, but he remained unable to make any movement without suffering a great deal in the knee, which was slightly flexed, the limb resting on its outer side; and the fever continued with 130 pulsations and a temperature of 102° in the morning, and 103° to 104° in the evening.

The third day, by pressing upon the knee, I diminished its size and caused a quantity of pus to escape by the inner incision.

There was then no longer any doubt the abscess was articular as well as ossifluent. Knowing then from my own experience, and especially from the facts communicated to the Anatomical Society, in